CHAPTER 2

Open Distance Learning in action

2.1 What is ODL?

A classic short definition of distance education or distance learning is referenced in a paper by Grimes [Grimes, 1993]: "Any formal approach to learning in which the majority of the instruction occurs while the educator and learner are at a distance from each other". Grimes describes how technology has enabled the recent phase of distance education. Thus, he offers a simple, succinct definition for modern distance education "Taking instruction to the student through technology rather than the student to the instruction". Grimes also paraphrases Keegan who proposed specific criteria for distance education [Keegan, 1986]:

- Separation of the teacher and learner (during at least a majority of the instructional process).
- The influence of an educational organisation (including the provision of student evaluation).
- The use of educational media to unite teacher and learner (and carry course content).
- the provision of two-way communication (between teacher, tutor or educational agency and learner).

According to Snell [Snell et al., 1987] "Distance Learning has been defined as the conveying of knowledge to learners who are separated from the tutor in time and/or location".

2.1.1 Open Learning

This is normally taken to mean provision for learners where they have some control regarding how they learn, where they learn, when they learn and the pace at which they learn [Race, 1998]. Open learning sometimes also involves learners having some control of what they learn and how (or if) their learning will be assessed. The term "open" implies removal of barriers created through distance, time and

specific design [Lewis, 1986]. The definition of open learning can be further widened by the extent to which the responsibility for learning is taken on by the learners themselves. According to Brookfield [Birchall, 1998] in this wider definition open learning is referred to as self-directed learning where learners plan, conduct and evaluate their own learning.

Some other definitions of Open Learning are [Rowntree, 1992]:

According to Coffey: "An open learning system is one in which the restrictions placed on students are under constant review and removed wherever possible. It incorporates the widest range of teaching strategies, in particular those using independent and individualised learning"

According to MSC: "Open Learning: arrangements to enable people to learn at the time, place and pace which satisfies their circumstances and requirements. The emphasis is on opening up opportunities by overcoming barriers that result from geographical isolation, personal or work commitments or conventional course structures which have often prevented people from gaining access to the training they need".

According to Lewis and Spencer: ""Open learning" is a term used to describe courses flexibly designed to meet individual requirements. It is often applied to provision which tries to remove barriers that prevent attendance at more traditional courses, but it also suggests a lerner-centered philosophy"

According to Dixon: "... a wide range of learning opportunities that both aim to assist learners in gaining access to knowledge and skills they would otherwise be denied and give learners the optimum degree of control over their own learning".

According to Jack: "Open learning is a state of mind rather than a method with particular characteristics"

According to Holt and Bonnici: "Open learning is not just about access alone, it is also about providing people with a fair chance of success".

Many agree even today with MacKenzie that it is not so easy to define what open learning is. According to MacKenzie [Rowntree, 1992] open learning is "...an imprecise phrase to which a range of meanings can be, and is, attached... It eludes definition. But as an inscription to be carried in a procession on a banner, gathering adherents and enthusiasts, it has great potential". For Rowntree [Rowntree 1992] open learning is two different things:

- a philosophy - a set of beliefs about teaching and learning
- a method - a set of techniques for teaching and learning

Much of the confusion arises because people don't always realise that the philosophy can be practised without using the method. And, more commonly, the method can be applied without the philosophy (see paragraph 2.1.1.1).

2.1.1.1 How open is Open Learning?

No learning system or project is ever fully open. Nor is any fully closed. Openness is an ideal for which we must keep striving rather than a state we can expect to attain. What might a fully open system look like?

- Whatever you wanted to learn about, you would be able to get a project tailored to your wishes and at an acceptable price.
- You would get it when you wanted it, where you wanted it, and at your own pace.
- You would be able to set your own objectives, choose the content and sequence of your project, and decide when and how your learning would be assessed.
- You would also be able to decide how you wanted to learn – e.g. with others or on your own, from books or from videos, with the emphasis on theory or on a practice – and who might help you in what kind of ways.

And how would you get on a fully closed system? Strictly speaking, you wouldn't get in at all. But if you did get in then you'd have few of the choices mentioned in the previous paragraph.

- The project organisers would tell you what you had to learn about, the objectives you where expected to attain and how you would be assessed.
- You'd have to learn in a specified place, at specified times and the pace would be set by the organisers.
- The learning methods and sequence would also be set by the organisers and they would decide who might help you and what sort of help they might give. Your wishes or preferences would not be taken into account when these decisions were made.

Clearly there are two extreme scenarios. Most learning projects and systems lie somewhere on the continuum [Lewis, 1986] between these extremes. Some systems and projects are more welcoming and accommodating than others. So how do we compare the openness of one system to that of another? Lewis and Spencer suggest some 30 questions to help decide how far a system lies along the closed-Open continuum. Rowntree [Rowntree 1992] asks about a smaller set of factors under three main headings: WHO? WHAT? and HOW?

WHO? How easy is for someone to become a learner without restrictions of age, qualifications, wealth, job, etc? And to what extend will success depend on the learner possessing already the same learning skills and motivation and cultural background as the learners the system is used to dealing with?

WHAT? To what extend is the learner free to decide the content and objectives of the project and when and how he or she will be

assessed?

HOW? To what extend is the learner free to decide where, when and at what pace he or she will learn, the teaching / learning methods to use and the routes to take, and how he or she will call on other people for support?

2.1.2 Distance Learning

This is the term usually applied to open learning which takes place at a distance from the provider of the learning materials. The biggest and best-known distance learning system is part of the distance education movement. This embraces the hundreds of world-wide schools, colleges and universities who cater for learners studying at a distance.

2.1.2.1 How open is Distance Learning?

And what is the connection between open learning and distance learning? Simply this – if the philosophy of open learning is to do with improving access and learner-control, then the method usually involves some element of distance learning. However, while open learning usually involves distance learning, not all distance learning systems are particularly open. It is possible to use the method without the philosophy. Theoretically, distance learning needn't be open at all.

2.1.2.2 What kind of distance?

As with openness, a learner's learning may be more or less distant, and in a variety of ways. We need to ask exactly what the learner is distant from and for how long. There is often some element of distance even in a classroom based, on-site course. For example, which of the following will your learners be distant from?

- The teachers/trainers who developed their project
- Someone who can respond to their individual concerns or difficulties (e.g. tutor or mentor)
- The people who will access their learning for accreditation
- Other learners with whom they might pursue joint learning and mutual support (e-Hermes)
- Equipment or facilities that might aid their learning
- The context in which, or «clients» with whom, their learning is meant to be applied (e.g. student teachers learning in college rather than in school)

Notice that it is accessibility rather than geographical distance that matter here. Is there a key factor among the above? One's sense of distance depends chiefly on how quickly and satisfactorily one can get individual help or feedback from another human being whose viewpoints seem relevant-e.g a teacher, an assessor, another learner or a co-worker.

2.1.3 Flexible Learning

This term includes the sorts of learning involved in open and distance learning provision, but additionally relates to learning pathways in traditional schools, colleges and universities, where learners have some control of the time, place, pace and processes of their study of particular parts of their curriculum. It is sometimes regarded as a management tool for institutions, with its uses including removing barriers to access, improving choice for students and widening participation in higher education. Flexible learning has become another umbrella term, usually in the context of structured college-based systems of resource-based learning and learning support.

2.2 History of ODL [Boettcher, 1997]

	1st Generation	2nd Generation	3rd Generation	4th Generation
PRIMARY FEATURE	Predominately one Technology	Multiple technologies Without computers	Multiple technologies including computers and computer networking	Multiple technologies including the beginning of high bandwidth computer technologies
TIMEFRAME	1850 to 1960	1960 to 1985	1985 to 1995	1995 to 2005?
MEDIA	• Print (1890+) • Radio (1930) • Television (1950s and 1960s)	• Audiocassettes • Television • Videocassettes • Fax • Print	• Electronic mail, chat sessions and bulletin boards using computers and computer networks • Computer programs and resources packaged on disks, CDs and the Internet • Audioconferencing • Seminar and large-room videoconferencing via terrestrial, satellite, cable and phone technologies • Fax • Print	• Electronic mail, chat sessions and bulletin boards using computers and computer networks plus high-bandwidth transmission for individualised, customised and live video interactive learning experiences • Computer programs and resources packaged on disks, CDs, Internet • Desktop videoconferencing via terrestrial, satellite, cable and phone technologies • Fax • Print

	1st Generation	2nd Generation	3rd Generation	4th Generation
COMMUNICATION FEATURES	• Primarily one-way communication • Interaction between Faculty and student by telephone and mail • Occasionally supplemented by on-site facilitators and student mentors	• Primarily one-way communication • Interaction between faculty and student by telephone, fax and mail • Occasionally supplemented by face-to-face meetings	• Significant broadband communication from faculty to students via print, computer programs and videoconferencing • Two-way interactive capabilities enabling asynchronous and synchronous communication between faculty and students and among students • Internet good for text, graphics and video snippets	• Two-way interactive real-time capabilities of audio and video • Asynchronous and synchronous communication between faculty and students and among students • Full 30-frame-per-second digital video transmission with databases of content resources available via the Internet and WEB • Lengthy digital video programming available on demand

	1st Generation	2nd Generation	3rd Generation	4th Generation
STUDENT CHARACTERISTICS AND GOALS	• Student generally isolated from faculty members and other students • Students must be mature, highly motivated and disciplined • Students generally working on core educational requirements or lifelong enrichment • Occasionally used for large, isolated groups of students with site monitor or mentor	• Increased contact between faculty and students by telephone and occasional face-to-face meetings • Student generally still primarily isolated, studying in home, often at unusual times, by self • Student highly motivated and self-disciplined • Student generally working on core educational requirements or lifelong enrichment • Occasionally used for large, isolated groups of students with site monitor or mentor	• Increased contact between student and faculty via computer-mediated communication • Increased contact and collaboration between students in the same project • Technologies support the development of a learning community between the students and the faculty • Increased face-to-face meetings, often for longer periods, such as three to fourteen hours • Maybe working on core education requirements, advanced degrees, professional certification, or lifelong learning • More faculty direction and support is possible; less-disciplined learners can be supported • Goal to develop skills, knowledge, attitudes	• Increased contact between student and faculty via computer-mediated communication • Increased contact among other students in the same program • Technologies support the development of a learning community between the students and the faculty • Increased face-to-face meetings, often for longer periods, such as three to fourteen hours; also face-to-face contact through desktop videoconferencing • Student may be working on core education requirements, advanced degrees, professional certification • More faculty direction and support possible; less-disciplined learners can be supported • Goal is to develop skills, knowledge, attitudes

	1st Generation	2nd Generation	3rd Generation	4th Generation
EDUCATIONAL PHILOSOPHY and CURRICULUM DEVELOPMENT	• Highly structured materials, such as projectd learning • Materials almost 100 percent pre-packaged for stand-alone delivery, supplemented by tutor or mentor, a novice expert • View of student as empty vessel; primary goal is information dissemination	• Materials almost 100 percent pre-packaged and structured for independent learning • Highly dependent on instructional systems design to compensate for lack of direct and immediate student-faculty interaction, spontaneity • View of student as empty vessel	• Materials must still be highly structured and instructionally designed; interactive technologies can provide more ad hoc direction and support of learners • Materials vary from 100 percent pre-packaged to about 30 percent pre-packaged, with more faculty or mentor direction and support • View of student as active learner, participant and contributor	• Materials must still be highly structured and instructionally designed; interactive technologies can provide more ad hoc direction and support of learners • Materials vary from 100 percent pre-packaged to about 30 percent pre-packaged, with more faculty or mentor direction and support • View of student as active learner, participant and contributor
INFRASTRUCTURE COMPONENTS	• Postal service for delivery of print materials • Radio technology in home • Radio and television broadcast stations and towers • Instructional project designers, developers, producers • Significant up-front investment • Faculty tutors or site facilitators, depending on model	• Widespread television in homes and schools (1960) • Widespread audio and videocassette technology (1980) • Instructional project designers, developers, producers • Significant up-front investment • Faculty tutors or site facilitators, depending on model	• Widespread use of computers and multimedia • Critical mass of ownership of computers with online services • User-friendly technologies are needed to ensure access • Instructional project designers, developers, producers • Significant up-front investment • Faculty tutors or site facilitators, depending on model	• Critical mass of ownership of computers with online services • User-friendly, affordable multimedia Internet technologies • User-friendly technologies needed to ensure access • Instructional project designers, developers, producers • Significant up-front investment • Improved development tools for complex media design and development

2.3. Key points in Open Learning

2.3.1 Self-action and ODL

Open learning should be learning by doing [Race, 1998]. Almost all learning happens best when coupled with experience, practice, trial-and-error and hands-on activity. The student's self-action must be the leading element in the teaching process [Berge, 1993; Bleichroth, 1991]. Shank's learning "environments" are dependent upon the students traversing their own pathways, asking questions, finding analogies, and listening to stories. [Eisenstadt, 1998]. Dewey [Danassis-Afentakis, 1992] regards guidance as a necessary precondition for students' self-acting learning but not in the sense of teacher's authority but through the provision of motives to the students in order to attract its interest.

Participation enhances learning: It is widely held that increased students' participation stimulates interest [Gangoli, 1995; Todt, 1993; Lechner, 1992]. Thus the participation of the students at all steps of the e-Hermes project was safeguarded. Students not only set their own research targets based on their own data but even have the possibility to comment on the project and influence the continuous redesign/ upgrade of the e-tool.

Learning is the outcome of formulating questions, researching, investigating and sharing results: The advantages of familiarising students with scientific methodology in comparison to simply transmitting knowledge are obvious [Newton 1988; Sandford, 1988; Hodson, 1992]. e-Hermes though went one step further than most approaches that stress observation and experimentation, in that it expanded the limits of the class, by creating a virtual society of researching students that were in daily contact [Savas, 1998]. Scientific inquiry was not merely simulated within the framework of a single classroom but became a complete process starting from experimentation and reaching out to every aspect of modern scientific inquiry: calibration of measuring instruments, collection of data, formulation of hypothesis, analysis of data, extraction of results, communication of the results through electronic newsgroups specifically designed for the project, presentation and publication of results in a refereed journal (E.S.E.M.). The transmission of the methodology of natural science is a very ambitious objective as it offers students a powerful tool for autonomous inquiry.

The instructor in an ODL project is not transmitting new knowledge but is helping the learners discover what they can (and want to) [Bar-on, 1997]. In addition the instructor in a virtual classroom can be effective only if he can offer his learners flexibility for their involvement in the "lesson" [Stevens, 1997].

Open learning needs to address learners "will" to learn. Effective open learning materials are intended to enhance learners' motivation, by being user-friendly, easy to follow and supportive.

Open learning should be designed to help people learn at their own pace. Many of the problems with traditional forms of teaching, training and instruction arise because of the pace being too fast or too slow for learners.

Inquiry learning is a new technique to many teachers. No longer is the teacher "the sage on the stage"; [Sherry, 1996] the deliverer of a fixed body of information; he becomes the facilitator of discovery learning for her students, through progressive discourse. Thus, even if a teacher is well-practised and at ease with the equipment in the classroom, she still requires training in order to integrate new teaching strategies with the technology.

The Office of Technology Assessment notes that inquiry teaching promotes an environment that tolerates ambiguity and encourages students' questions. In their studies of classrooms using the "Voyage of the Mimi" multimedia program, OTA researchers observed that teachers tended to ask the majority of the questions, rewarded students for guessing correctly, and required continual help in maintaining a classroom climate that emphasised reasoning rather than right answers. Only those teachers who had experience in inquiry-based instruction used the materials in open-ended ways. They found that it was important not only to provide training in the scientific concepts covered in the materials, but also to give participating teachers rich and varied suggestions for classroom activities.

Distance educators in the Far View Project have developed several inquiries learning modules. Collaborative groups of young distance learners participated in self-discovery activities, using manipulative and conducting experiments under the guidance of the site facilitator, and then discussed their experiences with the studio teacher.

2.3.2 New possibilities for learners – new roles for teachers

Key point of differentiation of ODL from other forms of education is the possibility that the learner has to choose the place (and time) for his learning. Especially with the contribution of new technologies the freedom (or better the flexibility) that the learner has helps to create an attractive learning atmosphere. The teacher must shift [Rowntree 1992] from saying “This is what I’m going to teach you and it’s your job to learn it” towards saying, “How can I use my interests and expertise to help you build on whatever your interests and strengths may be?”.

Where *disseminatory* teachers[1] are primarily concerned with their **product** (e.g. a package), *developmental* teachers[2] are primarily interested in **process** – the on-going relationship with the learner.

Effective distance learning requires extensive preparation, as well as adapting traditional teaching strategies to a new learning environment which often lacks visual cues. Porter [Sherry, 1996] speaks of the triad consisting of the student, the teacher,

[1] Boot and Hodgson [Rowntree, 1992] have introduced the “dissemination” model of learning : “knowledge can be seen as a valuable commodity which exists independently of people and as such can be stored and transmitted”

[2] Boot and Hodgson offer, by contrast, what they call the development model of learning. The aim of this, they say, is: “the development of the whole person, especially the continuing capacity to make sense of oneself and the world in which one lives.”

and the site facilitator, all of whom must function as a team. Students must quickly become aware of and comfortable with new patterns of communication, learn to manage their time, and take responsibility for their own learning. Teachers must enable students to establish contact with them, as well as interact among themselves. Site facilitators can act as the on-site "eyes" and "ears" of the teacher, stimulating interaction when distant students are hesitant to ask questions or participate in discussions.

2.3.3 Virtual classroom, virtual classmates and new technologies

New information technologies have formed to a great extent the contemporary research questioning for the future and present of education. Adamson & Macembo [Petre et al.,1998] noted that universities respond to social trends, and it is natural that they should follow the trend to use technology. The main representative of new technologies, the computer, has given a few decades ago many hopes to the pedagogists that the future of education would be dominated from teaching machines that could take over teacher's role in some extend. These expectations did never come true. The charting of learning structures and the decoding of the physiology of the way we learn is something far more complex than our present capabilities allow. So the subject of learning machines must be considered closed. The discussion about ODL and new technologies couldn't bring this back to surface again. During the forthcoming period of change, it is tempting to think about the development of "virtual classrooms", which evoke images of a new era of "wired users" undertaking multimedia distance learning. But we are convinced that this image is wrong [Eisenstadt, 1998]! The virtual classroom and the virtual classmates are concepts that are related exclusively to the distance between learners and to the creation of a favourable learning atmosphere and not to the taking over of the teaching procedures from a computer.

Scott and Eisenstadt [Eisenstadt, 1998] claim that the harsh reality is that the virtual classroom can be a very unrewarding experience for two reasons: (a) the technology can get in the way; (b) even if the technology works brilliantly, the real classroom experience itself is usually pretty depressing - what an awful thing to look forward to! Therefore, we must try to address both the technology and the way it is used.

Communication technology is also a means of "un-distancing" the distance [Smith, 1998]. There are really only two approaches to distance education according to Daniel [Daniel, 1998]. The first approach to distance education targets *individual learning*; the second focuses on *group teaching*. The most important difference lies in the form of communication. The group teaching approach is based on synchronous communication. Teachers and students must communicate in real time. The individual learning approach is based on asynchronous communication. The creation of a virtual learning environment enables students to study where and when it suits them. In the group teaching scenario the teacher communicates with students in a network of classrooms in real time. It is a teacher-centred form of education. That's not meant pejoratively. It's simply a fact that if you try to set up a system for a teacher to address a number of remote groups you must design it from the teacher's point of view. Under the individual learning scenario you re-create the campus in

thousands of homes and workplaces – so it has to be a student-centred approach. You must figure out what constitutes an effective home learning environment for the student.

A virtual classroom with virtual classmates does not necessarily mean that we talk about group teaching. In the case of the embedding of the methods of ODL in the curriculum and in the conventional educational process as an add-on service we could have many conventional classrooms where the individualised teaching plays a significant role. In the same time equally significant is the co-operation between the virtual classmates exclusively with the help of new (Internet) technologies. Collaboration involves working through and understanding a problem with others. The implication is that the presence of partners, bringing their own contextual knowledge and conceptualisation of the problem, will aid in its resolution [Whalley, 1998].

2.4 Motivating the learners

No problem here, some may think. Open learners are thrilled to bits to be given new opportunities and they're highly motivated, aren't they? Don't be misled by the rhetoric. This may be true in some cases for some adult learners especially in vocational training [Rowntree, 1992].

A person may be (intrinsically) interested in what he is learning. Or he may be (extrinsically) interested in what he hopes will result from the learning (e.g. a higher mark, a degree, a promotion a pay-rise…). Sagar and Strang [Rowntree, 1992] found that learners with intrinsic interests tended to get higher grades than those with extrinsic interests. This is not surprising. Extrinsically motivated learners are rather inclined to study as little as they can get away with.

In e-Hermes project there where 2 groups of students that correspond to these two schemes.

- In the first year the students that where involved in the project did that voluntarily. There where students that stayed at school in order to work for the project when all the others where gone. Clearly you may characterize these students as having intrinsic interests for the project as they spend their free time for the project feeling that what they are learning is worth-learning. This kind of learners is very important for the success of a project. The disadvantage in this case is that the number of the students that are willing (or just have the time) to participate in the project is inevitably limited. Also, the extra burden that must fall on the shoulders of the students must be very light: there is no room for another couple of hours of "traditional" lesson. That obliges the teacher to find each time new and innovative ways to keep the students interest in high levels in order to have them again in the next meeting. This is as difficult as it sounds.

- In the second year the students that where involved in the project did that within the framework of the official curriculum. This means that the number of students that took part in the project was the biggest possible. But it is

clear that in this case there are beyond any doubt students that have (if any?) extrinsic interests for the project. Even in this case the motivation of a higher grade is a not bad starting point. But we must – in managing our project, in developing teaching materials and in talking with individual learners – promote the intrinsic benefits that learners might expect to get from their learning.

2.5 Supporting the learners

2.5.1 Learners need help

We accept, as a fundamental principle, that learners need support from their teachers, no matter how sophisticated their materials are, nor how elaborate the learning environment is [Summer, 1998]. This support may be provided in a variety of ways, and need not always be from the teacher to the learner on a one-to-one, face-to-face basis. But we can -and do- confidently assert that students will always need help!

Your learners may need help of various kinds (e.g. the help they need in order to successfully participate in a Bulletin Board or a Videoconference is described paragraph 2.8.1.4.). They may need help before they even begin learning, as well as during and after a learning project [Rowntree, 1992].

Might your learners need help and support with…

Before they begin

… recognising that they need to learn
… deciding what they want from learning
… deciding the best way of achieving it
… assessing their present experience and abilities
… selecting an appropriate open learning package
… finding other learners who have worked through it
… negotiating a personal open learning project
… deciding what support they might need
… obtaining financial help

To do with tackling the work

… planning a timetable
… getting themselves organised
… improving study skills
… learning from new media e.g. computers
… overcoming a technical problem
… making the most of class sessions
… learning from other people informally
… reflecting on what and how they are learning
… producing assignments to be marked by a tutor

… taking tests and examinations

To do with the content of the project

… making sense of it
… sorting out misunderstandings
… challenging its viewpoints
… getting an alternative viewpoint
… relating the content to their own experience
… deciding which bits to concentrate on and which they can leave out

To do with their lessons at school

… seeing how what they are learning might relate to their lessons
… getting to use facilities at school
… setting up projects that let them practise what they are learning
… getting their teachers to recognise their new competence

To do with assessment

… understanding or negotiating how they are to be assessed and by what standards
… getting expert comment on how well they are progressing
… learning to assess their own progress realistically
… deciding when they are ready to take a competence test or final exam
… psyching themselves up for a test or final exam
… deciding what to do next in the light of how well they have done.

To do with them

… getting a realistic idea of their own ability and prospects
… keeping things in proportion
… coming to terms with new beliefs or values
… coping with stress
… enjoying the learning
… sorting out conflicts (e.g. between the school, home and the project)
… keeping going when they begin to wonder if the sacrifices are worthwhile

Fortunately most learners don't need every kind of help that's listed. On the other hand learners might need some additional kinds of help that aren't mentioned above.

Smith and Birchall [Smith, 1998] described the needs of the learner on an open learning project:

- access to resources in the form of information or content
- access to tuition through lecture, tutorial, discussion or sometimes computer-aided learning tools

- access to support, both academic, through teaching, facilitation or mentoring; through provision of appropriate additional information, confirmation of understanding and clarification, and through social support from peers.

The embedding of an ODL project in the official curriculum enables the teacher to focus his skills and experience on areas where learners really need his help [Race, 1998]. The teacher can move towards being a *learning manager*. This helps him have more time and energy to focus on individual student's needs and difficulties, rather than simply delivering the content of the curriculum. Some of the most satisfying parts of the work of trainers are seeing the individuals have been helped and developed.

2.5.2 Learners' attitude towards ODL

It has already been established (Stevenson et al, 1998) that students come to ODL with different ideas about what the experience will be like. It is important to work with students' expectations of distance teaching, particularly to find out the way the students hope to be taught, the way they expect to be taught and the way they hope not to be taught.

What do your learners know already about the subject they'll be studying? It's most unlikely that the subject will be totally new to them. Even if they don't have knowledge and skills, they are likely to have ideas, attitudes, even prejudices [Rowntree, 1992]. They may even have more experience than you in some aspects. Knowing their present familiarity with the subject can be a great help in developing a project that they can truly engage in.

At the very least, can you help them avoid repeating work that they are already familiar with. Or you may need to recommend some prior study to get them "up to speed". More positively, you may be able to focus the project on common misconceptions or conflicts of viewpoint.

The traditional model in education and training has been "top-down". The bottom-up approach apparently can lead to high level of credibility. For example in the e-Hermes project we considered as a given fact that the students that would be involved in the project already knew how to make a plot if the data were given to them. The students have been taught in previous years the technique of making a diagram and they probably have made a lot themselves both in the lessons of Mathematics and Physics. So emphasis was placed not on the construction of a diagram from a white piece of paper. We wanted the students to be able to interpret a diagram and find the information that lies beneath. The important thing is to find the correlation between the variables in a diagram and try to go a step further: to be able to request new diagrams (with new variables: that means new measurements) in order to verify (or reject) the conclusions that were drawn from the first diagram.

2.6 Supporting the trainers

Guided practice [Sherry, 1996]

The more familiar teachers are with the instructional design and delivery process, the more effective their presentations will be. On a practical note, they need training in instructional message design, strategies for delivering instruction on-camera, methods of diversifying types of presentation, selecting various mixes of student-teacher activities and interactions, choosing situations and examples which are relevant to their students, and assessing the level of learning by distant students. They also need plenty of guided, hands-on practice developing and delivering courseware using audio, full-motion video, graphics, and text, in front of a live audience, yet still in a non-threatening situation. Strategies such as using fewer overheads and more moving video, interspersing "talking heads" with videos of sites, using hands-on experiments, incorporating text and graphic art, and other guidelines for effective video production are also valuable.

Site facilitators, too, benefit from training programs which emphasize hands-on practice with the equipment they are expected to use. Sherry and Morse found that those who had participated in structured training programs felt comfortable using the equipment, were able to engage their students in the learning process, and had mastered classroom management in a high-tech classroom.

Administrators cannot expect teachers to feel comfortable with the technology, to use it effectively, and to maintain it as well, without giving them extra resources and time. Instructors need access to data links and e-mail, as well as video links. They need to download and upload resources and lesson plans, consult with other teachers, and try out new learning modules.

Apple Computer has found that it takes up to two years for instructors to adjust to and work with the tools, to implement them successfully, and to integrate them into their curriculum.

Teamwork [Sherry, 1996]

Progressive teachers who are early adapters of technology can become change agents for their peers. They can support other teachers by planning ahead as a group, and by working with the learning modules and equipment before using them in the classroom.

2.7 The Web: a new tool in ODL

2.7.1 What is the Internet?

At a technological level, the Internet is millions of computers (no one is quite sure how many) interconnected through the world-wide telecommunications systems.

All these computers are able to share information with each other because they use common communications protocols.

At the human level, the Internet is the people who use those computers and the information they share. The people come from all walks of life, acting both as private individuals and representatives of organisations. Everyone on the Internet can publish information on any subject they wish, and almost everything published is available to everyone else. As a result, the content is staggeringly extensive and varied.

Finally, the Internet is a technological, social and cultural phenomenon, unlike anything the world has seen before. It has emerged as such not because of some ideology or social manifesto, but simply because of its anarchic technological structure. It was inevitable to have a strong influence over the whole field of education [Karaliotas, 1997].

2.7.2 What Internet has to offer to education?

The value Internet technology brings to distance education lies not in direct translation from other media but in the transformation of support mechanisms to exploit its potential range [Petre, 1998]. Costs and gains:

Costs

- More technical support....
- Tutor expense....
- Student expenses....
- Equipment upgrades for tutors....
- Loss of social interaction for some....
- Less satisfactory tutorials....

Gains

- More rapid feedback for students....
- Increased tutor collaboration and communication....
- Greater access for students....
- Increased administrative efficiency....
- Reduction in administrative errors....
- Potential for flexibility....
- Reduction of time and place constraints....

2.7.3 The Knowledge Web

There are three main arguments [Stutt, 1998] for the importance of knowledge modelling techniques in the context of developing the Knowledge Web.

- Formalisation argument. This argument emphasises the importance of formalized components, such as those produced by knowledge modelling

techniques, in constructing the Knowledge Web. It is easier for the software agents populating the Web to understand, reason about and share formalized components. As Luke et all point out [Stutt, 1998], "the Web is a disorganized place... Web users are finding it increasingly difficult to gather information relevant to their interests without considerable and often fruitless searching. Much of this is directly attributable to the lack of a coherent way to provide useful semantic knowledge on the Web in a machine -readable form". Thus, future generations of search agents may need to understand the contents of knowledge resource in order to support effective knowledge retrieval tasks. This goal can only be achieved if knowledge resources are associated with ontological specifications (including those for commonly performed tasks and their common solutions in particular domains), which describe their semantic contents.

- Argument from education. The Web already provides a wealth of educational resources. However, these are mostly static. New dynamic resources are needed, which can provide inferential and discovery capabilities, thus transforming the Web from a passive repository of educational material to an active learning resource. More over, consistently with the constructivist view of knowledge – according to Jonassen [Stutt, 1998] -, a number of researchers, such as Wideman and Owston [Stutt, 1998], have shown that involving students in constructing knowledge models improves their understanding of a discipline. Stutt builds on these results and argues that the application of knowledge modelling to education "may provide the means for achieving some of the larger ambitions of constructivists researchers".

- Political argument. Knowledge is being produced at an ever increasing rate. Moreover, globalization and concomitant technological advances mean that the traditional barriers to the diffusion of ideas have been removed. At the present time we can publish a paper on the Internet and it immediately becomes accessible to millions of potential readers. However, while we may all be publishers (and thereby knowledge producers in a traditional sence), only those communities which will be able to produce knowledge in a form which can be understood by the various semantic agents populating the cyber-world will become cyber-knowledge producers as well. Hence, we predict that, at least within the scientific community, the ability to (semi-)formalize ideas by means of the appropriate knowledge modelling languages will become a strong indicator of the influence of an individual or a group over discipline.

It must be understood that the Web is not just a depository of some (whatever) content [Eisenstadt, 1998]. So the Web is more than a universe of information, it is a meeting place for people and "robots" of one kind or another, a mixed society of humans and computers each reading one another's text and publications [Watt, 1998].

The push to add "intelligence" to the Web has always been very strong, and is motivated by the realization that its open, distributed and powerful infrastructure can

be exploited to effectively provide services that go beyond simple document distribution [Riva, 1998].

The Web can be conceived both as a locus where the boundaries between real and virtual, human and artificial, are dissolved and as a medium for the transmission and collaborative construction of artefacts [Stutt, 1998]. The following are the main ways in which the Web can be viewed as epistemified:

- it acts as a distributed repository of data, opinion and knowledge
- it serves business, education and the research community as a two-way channel for the flow of information, opinion, argumentation, software and other commodities
- as a two-way channel it can be used as a communicative tool in the collaborative construction of arguments, research papers, software, buildings;
- it is populated by epistemic agents: spiders, bots, search engines;
- it serves as a forum for the mediation between multiple intelligent agents (whether software or human);
- according to De Kerckhove [Stutt, 1998] it is itself an intelligent entity, adaptive, evolving.

2.7.4 Creating a subject-independent platform over the Web. Examples.

The *T-IDDM* project [Riva, 1998] is an EU-funded project whose goal is to develop a distributed telemedicine system to assist in the routine management of insulin -dependent diabetic patients, by offering to patients and physicians a set of services designed to increase the effectiveness of the therapy. The system is composed of several co-operating modules; one of them is located at the patient's home (the Patient Unit), while all the others compose the Medical Unit, usually located inside a Hospital Information System. The task of the Patient Unit is to collect patient data coming from daily self-monitoring (e.g., blood glucose values), to store them in a local database and to upload them to the Medical Unit during periodical connections over a telephone line. The Medical Unit stores the data coming from all the patients being followed, and provides the physicians with tools to retrieve the data, analyse them, and modify the therapy the patients are following according to their clinical situation.

The *e-Hermes project* is an EU-funded project where a subject-independent Internet software platform (e-Tool) has been developed. The e-Tool can produce comparative graphical representations giving to the user total control over the production of the graph. The suggested model tried to accommodate both the constraints and the opportunities inherent in electronic communication in order to

provide valuable functions within the simplest effective technology - and yet emphasised structure, asynchronous communication.

2.8 Web conferencing: Design to support learning

Generating and supporting dialogue within an ODL project, or using a conferencing system as a supplement to face-to-face teaching, is a serious challenge if the Web is to serve as an educational medium [Stradfold, 1998]. A distance learning project where the learners have never met and their only means of contact with each other and the tutor is the conference system, must be the most challenging situation of all.

Asynchronous computer mediated communication has now reached a state of maturity [Stradfold, 1998]. Yet opportunities still exist for innovative ways to integrate conferencing and the Web.

2.8.1 Bulletin Board

An educational use of a Web discussion system (Bulletin Board) is likely to be different in nature to other uses. Typically, educational uses of the Web for learner dialogues will have the following characteristics [Stradfold, 1998]:

- *Limited number of users*. A conference system as part of an educational course is likely to be of interest to a particular group of learners, a class for example.

- *Frequent visits*. Learners will want to make frequent visits to the system to find and add new messages.

- *Closed environment*. The system is able to restrict access from people who are not part of the course.

- *Focused discussions*. Discussions are likely to be guided or focused around particular issues.

- *Review of messages*. Some mechanism to allow learners to search and review messages is important in assisting revision or putting together a message that draws on other contributions.

- *Extended interaction and collaboration with other people*. As the BB is used over a period of time and for complex interactions the system should support clear ways of viewing and working with dialogues that take place.

2.8.1.1 Structure of a BB

The structure of the BB must be hierarchical containing important information that is an essential part of following and contributing to a dialogue [Stradfold, 1998]. There are three pieces of information that must be available: *attribution* (who said what), *sequence* (in what order) and *relationship* (to whom). This much seems common sense and most systems (not all) have this information. Because an interchange in a Web conference may well take place over a period of weeks it is important that this information is easily visualized. A learner who is returning to a conversation some days later, or catching up on new messages, needs this detail.

2.8.1.2 BB management

One should has the possibility to remove messages that are either irrelevant to the subject that is being discussed or just too old. You should also make sure that the access to the BB is password protected and generally pay a lot of attention in security matters. You certainly do not want anyone in the Internet to have free access to a discussion with teenagers.

2.8.1.3 BB: a chance to simulate a scientific debate

A good debate displays the following features [Shum, 1998]:

- Open to multiple perspectives to all relevant parties.
- Informed by relevant evidence / resources. Participants should have the time to seek out relevant evidence to back their case.
- Dynamic. The debate should be also quick enough to support dialogue, that is, it should not take so long to reply to a point that the dialogue cannot progress, or moves on to other issues.
- Carefully constructed. Contributions to the debate should be made after appropriate reflection, and not elicited under the pressure of the moment (as can happen in face-to-face debates when, for instance, a long silence must be broken, or a quick reply forced by clever rhetoric).
- Cumulative. The debate should allow participants to single out and reply to multiple threads in an argument in parallel, so that discussion can proceed in any different fronts, without being confusing.
- Preserved. We contend that the debate should be preserved, to accompany the publication. It should be publicly inspectable as a valuable trace which shows how the final conclusion came into being. Normally, this trace is left for scientific historians to uncover in order to shed light on the influences which shaped a theory.

2.8.1.4 Maintaining online discussion

Experience on these courses tells us that for effective discussion the students have to be working on the same topics at the same time [Stradfold, 1998]. Students who lag behind adding messages to conferences that are a couple of weeks out of date do not get feedback from other students. What is more, they have a stack of messages from other people to read. Conference could be managed so that soon after a week of study is finished, the conference area for that week becomes read only. Students who still have something to add can leave messages in a continually open discussion area. The advice for learners who have dropped behind is to skip work so they can catch up [Stradfold, 1998]. Students need to feel a better sense of community; a feeling of being listened to is an important factor in saying anything, so responses from tutors and fellow learners are important. But it is not always easy to compose a detailed response to a message. It is not always easy to think of something original to say each time. In a face-to-face situation a short reply saying "that's right" or "those are good ideas", or even just nodding as a learner talks is all that is necessary to encourage the student. In an asynchronous medium these kinds of messages appear awkward - these moments of encouragement are frozen in time. Leaving several such messages in a thread to save time is worse, though probably not as bad as giving no feedback.

Nixon and Salmon [Masterton, 1998] suggest that students need the maximum amount of support in the early stages of using electronic conference. It has been found by Salmon and Giles [Masterton, 1998] that greeting students and offering words of encouragement, even if initially automatic, helps improve their motivation and the likehood that they continue to use conferencing.

2.8.1.5 BB systems

There are an even increasing number of Web conferencing systems (videoconferencing and Bulletin Boards). Each of these systems has particular properties, some being more suitable for educational uses than others, as defined by the above requirements. It is inevitable that whatever system is chosen for a project will impact on the design of the course and on the learner's experience [Stradfold, 1998]. A wealth of relevant software could be found all over Internet (freeware and downloadable).

2.9 Producing educational material for an ODL project

2.9.1 Quality material production

Quality material means [Petre et al., 1998]:

- relevant and of high quality academic standard in its content

- effective in conveying the desired information

- suitable for diverse student population
- supporting of large independent study
- engaging the students
- consistent in its delivery and assessment
- cost-effective in its use of resources

2.9.2 Know your learners before material production

When the teaching will be done through packages – especially when learners are studying at a distance – we need to obtain information about them before they begin. Otherwise it cannot affect the teaching as much as it should. There are three ways of building up a picture of your prospective learners [Rowntree, 1992]:

- Reflect on previus experience of those learners, or similar ones, and consult colleges.
- Meet some of the perspective learners and discuss with them (individually or as a group) what they would like from the project, and what they already know / feel about the subject.
- Send a questionnaire to prospective learners, trying to elicit the information you need.

What we discover about our learners may reveal numerous barriers, or potential barriers to learning. Some of these will be within us, some within our learners, and some in the relationship between them and us (or our organisations).

2.9.3 Prerequisites, Introduction, Layout, Time and Structure factors

The (if any) prerequisite knowledge or skills that the learner should have before being involved in and ODL project should have a great influence in the design of the learning material [Race, 1998]. It is possible that the learners should have to do some preliminary work in order to be able to participate successfully to the project. Also, users moving between systems take time to adapt to the new structure [Stratfold, 1998].

If the first contact with your learners is not face-to-face (something that is not recommended) but through a written introduction, you should be very careful about the content of this introduction. Your learners' attitudes are formed by the first few

minutes they spend with your material. The introduction must have an informative character. Don't try to introduce too much at once. Use the introduction to explain how the package will work best. It can be useful to explain any conventions used in the learning material and to let learners know in advance about any equipment or other resources they will need to have available as they work further with the material. The best time to write the introduction (or the final version of it) is when you know everything towards which it is leading. That is definitely after the end of production of the learning material.

Very important factor in the success of an ODL project is the layout and the structure of the materials. For open learners to trust them, the materials should look professional and credible. They should be able to find their way easily backwards as well as forwards trough the material. There should be good signposting, showing how each section of the material fits into the whole, and linking the intended learning outcomes to the tasks and activities in the material.

It is important to estimate the expected time which learners may need to spend using the materials. There are often indications of this built in to open learning materials, but you may need to work out upper and lower limits that would reasonably relate to your own least able and most able learners. Match these timescales to the overall duration of your open learning project and the relative importance of the topics addressed by the materials.

Simply translating material from familiar media into electronic form is rarely productive - and is certainly inadequate for supported distance education, which aims to engage the student in a "community of learning".

Keep sentences as short as you can. This is most crucial when difficult idea or concepts are involved. People are much more likely to make assumptions, possibly dangerous ones, about long sentences than about shorter ones. Also it is important to ask rather than tell. The question mark key is probably the most powerful one on your keyboard when it comes to helping people think that just to read. Asking a question brings the chance for learners to think their own answers before reading yours [Race, 1998].

2.9.4 Learning beliefs, styles and skills

Learners not only have orientations to studying and learning. They also have beliefs about learning – not to mention styles and skills of learning – that we may need to know about. What would your learners think of as learning? There are four conceptions of learning [Rowntree, 1992]:

- Learning as memorising (1)
- Learning as understanding (2)
- Learning as application (3)
- Learning as personal development (4)

Learners (and teachers?) who hold the most basic conception of learning (1) will be concerned largely with facts and procedures that can be reproduced under test conditions. This is the *Matermind* conception of learning. Learners holding the second, more sophisticated conception will not be satisfied simply to remember and reproduce the facts and procedures that they have been working with. They will search for ways of making them meaningful – perhaps looking for the ideas that lie behind them, or the patterns and relationships that help make sense of it all, or the links with their own beliefs and values. Learners who have reached the third conception will go further still. They will expect to apply what they are learning in some context of their own – and in the progress develop new ideas and procedures of their own. They expect their learning to help them see the world differently and perhaps find new ways of making things happen in it. From there it is but a short step to the most sophisticated conception of all (4). Here the learners recognise that they themselves are part of the world they might come to see or act upon differently. The learner expects to be changed as a person by the experience of learning. Even when the detail is forgotten, something will remain to leave them, in some sense, a wiser and more capable person. Learners may conceive learning differently from their teachers. And this could present a barrier to learning. If, for example, the assessment system is operating at level 1 or 2 when your learners yearn to be at 3 or 4, frustration looms. So it may be worth asking your learners what they think of as learning and helping them see how their conception relates to what might be happening in the project. It may even be one of the aims of the project to help them acquire more sophisticated notions of learning. Teachers too, of course, have their own preferred learning styles. In our traditional producer-centered way, we may tend to design projects that reflect our own preferred learning styles. These may or may not tally with those of our learners. Honey and Mufford [Rowntree, 1992] give many detailed suggestions about the kinds of learning activities that people with each learning style are likely to respond well or poorly to:

STYLES	Respond WELL to, e.g.	Respond poorly to, e.g.
Activists «*Here, let me do that.*»	New problems, being thrown in at the deep end, team work…	Passive learning, solitary work, theory, precise instructions…
Theorists «*Yes, but how do you justify it?*»	Interesting concepts, structured situations, opportunities to question and probe…	Lack of apparent context or purpose, ambiguity and uncertainty, doubts about validity…
Pragmatists «*So long as it works.*»	Relevance to real problems, immediate chance to try things out, and experts they can emulate…	Abstract theory, lack of practice or clear guidelines, and no obvious benefit from learning…
Reflectors «*I need time to consider that.*»	Thinking things through, painstaking research, detached observation…	Being forced into the limelight, acting without planning, time pressures..

If you are producing a project that must suit all corners, try, at least, to make sure that it is:

- novel and participatory enough for the Activists
- intellectually rigorous enough for the Theorists
- practical enough for the Pragmatists
- leisurely enough for the Reflectors

2.9.5 Material and active learners

The learners can gain useful knowledge by doing things in the “real world” as well as by working on packaged material [Rowntree, 1992]. Practical work is essential for many subjects, especially when our objectives relate to work-related competencies as well as knowledge. Many times knowledge can be acquired more easily and with deeper understanding and interest if the learner can carry out suitable practical work.

Ultimately, teachers must decide which educational tool is best for a particular task and if some form of technology can be effectively integrated into an existing curriculum [Watson, 1996]. These decisions are based on personal beliefs or views about learning processes. If teachers believe that all knowledge is constructed, instruction is a nurturing of these processes, and if they accept that literacy development is a social event then their classrooms should provide experiences to facilitate the construction process. Central to this view of constructivism is the notion of the learner as “active” not just responding to stimuli, as in the behaviourist rubric, but engaging, grappling, and seeking to make sense of things.

If the practical work involves equipment, and learners are studying on-site, then facilities can perhaps be scheduled at suitable times [Rowntree, 1992]. If they are studying at a distance, however, it may not be easy to bring them to a center to equipment the most opportune time-if at all. But the possibility is worth exploring. Otherwise, or may be additionally we need to consider the second alternative – sending the equipment to the learner. In the e-Hermes project the very expensive measuring instruments (that could not be bought for all schools participating to the project) were sent to a school for a specific period of time and then forwarded to the next school in order to take a complete set of measurements.

2.10 Media in an ODL project

2.10.1 Media available in an ODL project

Some of the media available generally in ODL up to date are [Rowntree, 1992]:

Printed

- Books, pamphlets, etc-already published, or specially written
- Specially written "wrap around" study guides to already published material
- Specially written self-teaching texts, e.g. "tutorials-in-print"
- Workbooks for use along with audiotape, computer, practical work, etc
- Selftests, project guides, notes on accreditation requirements, bibliographies, etc
- Maps, charts, photographs, posters, etc
- Material from newspapers, journals and periodicals
- Hand-written materials passing between learners and tutor

Audio-visual

- Audio-cassettes/disc/CDs
- Radio broadcasts
- Slides or filmstrip
- Film or filmloops
- Video-cassettes
- Television broadcasts
- Computer based training- CBT
- Interactive video
- Internet

Practical or project work

- Materials, equipment, specimens for learners own use – e.g. home experiment kits, keyboards, official forms
- Field-work or other use of learner's local environment – e.g. observation, interviews, collection of evidence, etc
- Assignments based on learner's school/workplace

Human interaction

At a distance

- Telephone conversation between learner and tutor (supplementing written communication)
- Learner-learner telephone communication
- Several learners in telephone contact at the same time, with or without a tutor, by means of a "conference hall"
- Video conferencing (via television networks)
- Computer (text-audio-video) conferencing

Face to face

- Learners self-help groups
- Help from mentors / technicians / others
- Occasional seminars, tutorials, lectures by tutors or other group organizers
- One-day, one week, weekend, or other short group sessions

2.10.2 How shall we choose media?

The most appropriate medium is not necessarily the first one that comes to mind. A low-tech media can be more powerful than high-tech media. It all depends on the circumstances. How can we decide which media to use in an ODL project? Here are some criteria you may want to take into account:

- Do any of your learning objectives dictate certain media? (e.g. if one of the objectives is computer literacy, (one of) the media that shall be used is obvious)
- Which media will be physically available to the learners?
- Which media will be most convenient for learners to use?
- Are any media likely to be particularly helpful in motivating learners? (e.g. well designed book with impressing photos can make the difference compared with the existing many times “static” schoolbooks)?
- Are you under pressure from the organisation to use / avoid certain media? (“we got all these computers, so let’s run an ODL project on them?” or “Internet is too expensive for us”)
- Which media will you (the teacher) be most comfortable with?
- Which media will learners already have the necessary skills to use?
- Which media will you be able to afford to use?
- Which media might you need to back up the main media and / or to ensure variety?

2.10.3 Suiting media to objectives

Most media can give learners some sort of help towards the achievement of most learning objectives. But, with certain objectives, some media may be more helpful than others [Rowntree, 1992].

Although we - the educators - are not the inventors of technologies we consider ourselves to be "power users" of those technologies, and feel we can cast

them in an innovative light by constructing our own environments with a mixture of existing and custom built-tools [Scott, 1998]. At the same time, we have no intention of re-inventing the wheel, and thus we are closely tracking the emerging technologies.

2.10.4 What suits the learners?

What you know about your learners may influence your media choice in a number of ways. To begin with, which media can your learners get access to? Even if you are prepared to give them or lend them the equipment, they might not find it convenient to use or they won't be able to use it in an efficient way without help (for example if you try to implement an ODL project in primary education using CBT without familiarizing the pupils with the new medium first) [Rowntree, 1992]. What suits you and your colleagues?

You may prefer a medium you can control. But once you are into video or computer, you are more likely to need help from media experts. This may be costly (although, the role of the expert can be –partly- played from a colleague with the relevant experience in the field). Furthermore, such experts may bring in their own production values and their own ways of using media. This opens up the possibility of conflict between what they consider "good CBT" and what you consider "good teaching".

The roles must be pre-defined and clear: you are drawing the lines (e.g. describing what an educational software may include and being capable of) and the expert just makes sure that they are implemented in the best possible way (writing the code, in a computer programming language, that works). The close co-operation will safeguard the final result provided that we take into account one another's feedback.

The more complex the media, the more control you may have to surrender. However, this may be acceptable to you up to a point (e.g. if it gives you the chance to acquire some of the skills of the experts).Are the costs acceptable? Cost is an inevitable constraint on your choice of media. You need to weight up the relative costs in staff time as well as cash of producing materials for different media. They may differ greatly from medium to medium [Rounder, 1992].

2.10.5 Combining media

Another factor you might consider in choosing media is how well to combine them. Rarely can one medium provide everything that a learner needs in a learning program of any duration. For instance any pre-packaged medium needs to be backed up by human support. And even a highly sophisticated medium like a computer controlled interactive DVD-ROM may need the simple back up of a printed booklet.

In the framework of the e-Hermes project apart from the electronic tool (educational software) that was used over the Internet, a magazine was printed conventionally presenting the results of the students research. And in order to exhibit

in the best way the combination of different media the magazine was published also electronically over the Web!

2.10.6 What do different media offer?

Teaching with print

More open learners spend more time learning from print than from any other medium. It can take many forms – e.g. specially written workbooks, study guides, ordinary textbooks, reference manuals, pamphlets and leaflets, maps and wallcharts. It can provide the learner not just with the written word but also with e.g. photographs and diagrams, graphs and statistics, checklists and tables.

Most people can learn from print, if they think that it is worth while. Learners can also personalize it by writing stuff of their own on the pages. Some learners however may have a school-bred aversion to print. From the providers' point of view, print is relatively easy to teach with (demanding no great media expertise) and it is cheap to reproduce.

The Internet can play a very significant role here by transforming the traditional concept of "print" material. There is no need to print hardcopies of the learning material and send them by conventional mail to the learners when you can use e-mail. Or you can publish the document on the Web and give your learners the Web address (URL).

In e-Hermes project the magazine -were the results of the students research was published- was printed both conventionally (hardcopies) and electronically over the Web (http://Web.ellinogermaniki.gr/e-Hermes/ehesem.html) in order to give an easy access to the maximum number of people.

Additionally you can write the document in .pdf format (using Acrobat software) and let your learners use Acrobat Reader ™ (look at http://Web.adobe.com/) in order to minimize the downloading time from the Web.

Audio Teaching

Here mainly recorded sound – usually of the human voice – is concerned. But other sounds (e.g. those of engines or musical instruments) may also be relevant to some learning. In the e-Hermes project you could found on the Web (http://Web.ellinogermaniki.gr/e-Hermes/wav_en.htm) the sounds of different places inside (and just outside) a school in different European countries. For example the sounds of a typical classroom during lesson hour, the sounds during the break or in the school's main entrance.

Sound can be a very powerful medium in open and distance learning. In the early years of the Open University, radio was the chief means of delivering it. Later, open learning projects made far more use of the audio-cassette as it is much more user friendly.

There are three main ways of using audio in an open learning package:

- *Just listening*. Talks, discussions, interviews, acted scenes, natural sounds.

- *Listening and looking*. Here learners have to use their eyes as well as their ears. They get document to use along with audio. It may contain diagrams, photographs, maps, charts, tables or figures, etc which the audio will talk them through.

- *Listening, looking and doing*. Sometimes the audio may ask the learners to carry out some practical work with materials and equipment or even with other people.

Some possible uses of audio are the following:

- To give learners a relief from reading

- To present new ideas to learners who don't care for reading

- To help learners make best use of their time by giving them a means of learning while doing other things

- To talk them through tasks like studying a map or a table of figures or a diagram – where they might find it distracting to have to keep turning aside to look at written guidance

- To help learners practise skills

- To make the teaching more human and personal

- To say things that aren't easily expressed in print

- To encourage or motivate learners

- To touch learner's feelings and attitudes

- To bring to learners the voices of people who would be unable or unwilling to say anything in writing

- To provide "source material" (e.g. an interview) for learners to analyse and react to

Scott pointed out [Scott, 1998] the significant role of audio in ODL mainly through the Internet "We know that audio carries the bulk of presence on-line, so good audio (an "audio-centric" focus) is curtail to the functioning of a web conferencing environment".

Fortunately, audio teaching is cheap and easy to prepare – without too much help from technical experts. Audio is a medium with enormous potential.

Video Teaching

Unlike audio, the production of video material is no do-it-yourself operation for the teacher or trainer. It demands access to rather costly production equipment and considerable amounts of time for planning and editing. If you aim to produce video material of your own, you may need the help of professionals. Such experts may well have ideas that conflict with yours and you may need to surrender some control. So further comment on video teaching is not within the main purposes of this handbook. Ending we would like to mention the three main forms that video teaching can take:

- Television projects (typical educational television projects)
- Video segments
- Interactive video

Computer Teaching

Computers can contribute to open learning in a variety of ways. If it is projectd appropriately, a computer can be the most powerful of open learning media - and certainly the one that can most easily adapt the pre-packaged teaching to the needs of an individual learner. After all it can:

- store huge amounts of information
- select from it at great speed
- present the learner with a variety of stimuli, e.g.:
  - text and animated graphics
  - still or moving pictures
  - recorder sound
- respond to whatever messages it gets from the learner
- give immediate feedback to the individual learner respond differently according to the different requests or answers it gets from different learners

Again, in theory, computers can be projectd to use their teaching potential in three main ways:

1. **Tutoring**. Here the project requires the computer to act as a patient tutor (see paragraph 2.3.3).
2. **Simulation / Visualisation**. Here the computer is used to simulate (with a project that is written in accordance with e.g. physical laws) or just

visualise a particular situation or system. The learner can interact with the simulation of the system (e.g. moving particles in a liquid) changing parameters of the system (e.g. temperature, pressure). Thus the learner will be able to experiment in total safety with, let's say, a nuclear reactor, an ailing hospital patient, the processes of geological change, or the economic structure of the EU, trying out their interpretation of the underlying principles.

3. **Data-crunching**. Here the computer is used as a means of searching large amounts of data and / or of manipulating it at high speed.

2.10.7 Choosing media: a research problem.

The variety of available media, too, presents a formidable research problem [Sherry, 1996]. One cannot compare print-based independent study courses, electronic projects on the Internet, classroom BBs, postings, audioconferences, and live, two-way interactive television, and expect that these comparisons will be valid. To add to this dilemma, media selection is often a question of media assignment. Sherry & Morse points out that teachers and site facilitators need training in those technologies which they are expected to use. McNabb notes that more experimental studies are needed in the area of media selection, where researchers can compare the effectiveness of different technologies which deliver similar content to similar audiences. It would be useful to analyze the content of a learning module, the goals of the students, teacher, and the school itself, implement some different technologies, and determine what factors influence successful delivery.

2.11 Computer Mediated Technology / Communication

2.11.1 Computer Mediated Technology and ODL

The different CMC systems each have distinctive features that impact on the manner and the extent to which they support the learning process [Birchall, 1998]. Paulsen [Paulsen, 1995] in his comprehensive report on CMC, summarises the three key differentiating factors as:

- the e-mail paradigm (one alone and one-to-one communication)
- the bulletin board paradigm (one-to-many communication)
- the conferencing paradigm (many-to-many techniques)

However, the difficulties of implementing such technology based learning environments need also to be acknowledged. Ease of access and skill development for new users provides motivation to overcome "learning curve" of unfamiliar technology. Turof identified four stages of development through which users of CMC progress [Birchall, 1998]:

- learning systems mechanics
- learning how to communicate electronically
- learning how to work electronically with a group
- learning how to adapt and develop the CMC system to maximise utility

Christiansen [Paulsen, 1991] describes some interesting conclusions from a CMC project in Denmark: "CMC gives more work to the teachers, but extra teaching hours have not been added to the courses; ", "the teachers have to be trained in the technical and especially in the educational use of CMC; ", "I am more and more convinced that many of the problems we are observing are not primarily due to CMC, but in part due to the implementation of it and in part to the way that distance education is organised. It is not CMC that causes the problems, but we become aware of the problems because of CMC. CMC can be an important tool in solving these problems. "

One area of particular concern to the developers is in ensuring that the technology doesn't dominate the learning process [Birchall, 1998].

2.11.2 The learners' attitude towards CMC

Learners are not only trying to master the subject or domain content, they must also now cope with [Summer, 1998]:

1. mastering a potentially complex assortment of software tools, and
2. developing new study habits to make effective use of these tools.

Recent empirical studies indicate that many learners, particularly those who are inexperienced with computer technologies, feel overwhelmed when faced with this new way of learning.

According to Conway, Kahney and Stasko [Summer, 1998] in other areas of education, it has been found that telling students the "whys" and "whats" beforehand improves their performance.

Some learners had little confidence in their ability to work and learn with the computer-based resources. What emerged from the interviews was that confidence was very fragile and took a lot of time and effort to cultivate and minutes to destroy. Several had long standing fear and anxiety about computers prior to the course and this was slow to change. Others had experienced setbacks, e.g., a difficult installation or "Web" session, that had shattered their confidence [Summer, 1998].

2.12 Technical aspect of an ODL project

2.12.1 Technical advice during the design of the ODL project

It is obvious that if you don't have a technical background you will need the help of an expert in order to decide what media you will use for the implementation of your ODL project. You have to be informed about the advantages and disadvantages of each media before you take the final decisions (see paragraph 2.9.3). It is possible to have a marvellous idea for an ODL project but you can not see it in flesh unless i.e. you don't have a direct satellite contact in your disposal. A technical consultant will bring you back to earth. Or he will send you back in heaven providing you with a cheap solution that does - relatively speaking - the same thing.

The use of commercially available systems is more cost and time effective but presents the instructional designer with questions as to what extent the project of study should be modified to fit into the existing system [Birchall, 1998].

2.12.2 Technical support during the run of the ODL project

You can't start talking about a modern ODL project without using the advantages that the modern technology has to offer.

It is obvious that having a team of professionals to back up technically the project is close to the ideal. But our experience from e-Hermes is that for a quality project it is adequate to have an all around technician (who will provide the necessary sense of security especially concerning the last minute problems). If the software needed for the project is available on the market (with the advantages and the limitations this means) the team for the technical support could be only that one all-around technician. If the software is meant to support an educational innovation then a professional team of software experts is the one for you (as the one that developed the e-Tool in the beginning of e-Hermes). It is a matter that depends absolutely on the budget of the project.

2.13 Managerial aspect of an ODL project

2.13.1 Management and ODL

Cynics sometimes ask, "What does management do? ". Management can be thought of as four functions: planning, organizing, motivating and controlling [Freeman, 1997]. In general there are the following management areas, having in mind a secondary education school that runs and ODL project:

- Providing course material

- Appointing, inducting, training and monitoring tutors

- Monitoring and evaluation
- Managing finance

2.13.2 Management: necessary or not in ODL?

In the e-Hermes project the shift of the managerial work from the teachers hands to a person that did that as his main job, had a great positive impact in the project. The organizational scheme was more clear to all participants and there was someone to deal with all the torturing details: from arranging the date and time for the next videoconference with schools abroad to organising internal meetings with the teachers involved in the project. If your project can afford this all-around person don't hesitate. It will be a great relief from the teachers back. It will let them focus on their primary activity: teaching. If your project can't afford a manager then be prepared to take over this job or just re-think it.

Collaboration may lead to a variety of misunderstandings [Zdrahal, 1998], for example: partners may misinterpret the shared knowledge because they do not take the original context into account, their understanding of the same concepts may differ due to differences in their professional background and experience, or they may be pursuing different objectives.

If the collaborators are working in different geographical locations additional complications will arise: all the aforementioned collaboration and knowledge sharing problems must be resolved at a distance.

2.13.3 Total Quality Management

Total Quality Management (TQM) is hard to distinguish from good management (if it can be distinguished at all) [Freeman, 1997]. TQM involves all the staff of an organization in thinking about, and taking responsibility for, the quality of what they do and of what the organization does. The aim is "continuous quality improvement". Thus, the emphasis is not on codifying good practice but on continuously reviewing practice in order to ask "Can we do better? "

Typically, TQM systems make use of a range of techniques [Freeman, 1997], including:

- *Brainstorming*, particularly for producing creative ideas for improving the quality of a particular process, e.g. how can we produce course materials more quickly to meet urgent needs?
- *Affinity networks*. These analyse the output of brainstorming sessions in order to identify links between different factors, e.g., brainstorming might identify all the factors which affect the quality of tutor feedback on assignments. Affinity networks can be used to analyse which factors are related to which others.

– *Fishbone diagrams*. These are a diagrammatic way of showing all the factors that impact on a problem or process. Groups can use these diagrams to help identify cause and effect, especially in problem solving.

– *Benchmarking*. In TQM, benchmarking refers to finding out the standard of relevant projects and then using that as a standard that you aim to achieve.

Often, these methods are applied through quality circles, i.e., group of colleges who meet to discuss and solve quality problems. Perhaps the most striking thing about TQM is the eclectic nature of its implementation. You can take the bits that seem to answer your current needs, try them out, and perhaps do something different. TQM is, after all, more a philosophy than a system.

The management implications of TQM in open distance systems include:

– The need to be clear about what the quality goals of the organization are, and to communicate these to all the staff. This can be particularly difficult when many of the staff may be remote. The need for face-to-face meetings (especially in the beginning) is very important for the success of the project.

– The need to show a total commitment to quality and to support staff in developing their commitment.

2.14. Financial aspect of an ODL project

2.14.1 ODL vs “conventional” project

Whether open and distance learning is cheaper than "conventional" learning depends largely on which media are used and how many learners are involved [Rowntree, 1992]. For example a satellite based videoconference using cutting edge technologies for a small group of learners is far more expensive than providing those learners with a number of classroom sessions. On the other hand using Internet for the videoconference for the same group of people or even better for more, is far more cheaper even from the conventional approach.

2.14.2 Costs in ODL

The major cost factor in ODL is people’s time:

- *the time of the staff who produce the materials*

John Sparks [Rowntree, 1992] has estimated the following amounts of teacher/ trainer time needed to produce one hour’s worth of learning in various media.

Lecturing	2-10 hours
Small group teaching	1-10 hours
Teaching by telephone	2-10 hours
Video-tape lectures	3-10 hours
Text	50-100 hours
Broadcast television	100+ hours
Computer aided learning	200+
Interactive video	300+

He also points out that all but the first three items on this list will need input from technical experts, some of them in considerable quantities

- *the time of the staff who support the learners*

In e-Hermes project learners needed a relatively great deal of support apart from the conventional teaching inside the classroom. The fact that the project was embedded in one of the “official” lessons of the curriculum did not mean that the teachers role ended when the bell rung. During calibration of instruments, the early stages of the measuring procedure, the use of the e-Tool, the videoconferences and the participation on the Bulletin Board, the writing of the articles for the ESEM magazine the active presence of the teacher was required.

- *the time of the learners themselves.*

In e-Hermes project the learners needed to spend some time outside the classroom to take measurements, input them in the e-Tool, participate in the videoconferences and write a comment in the Bulletin Board.

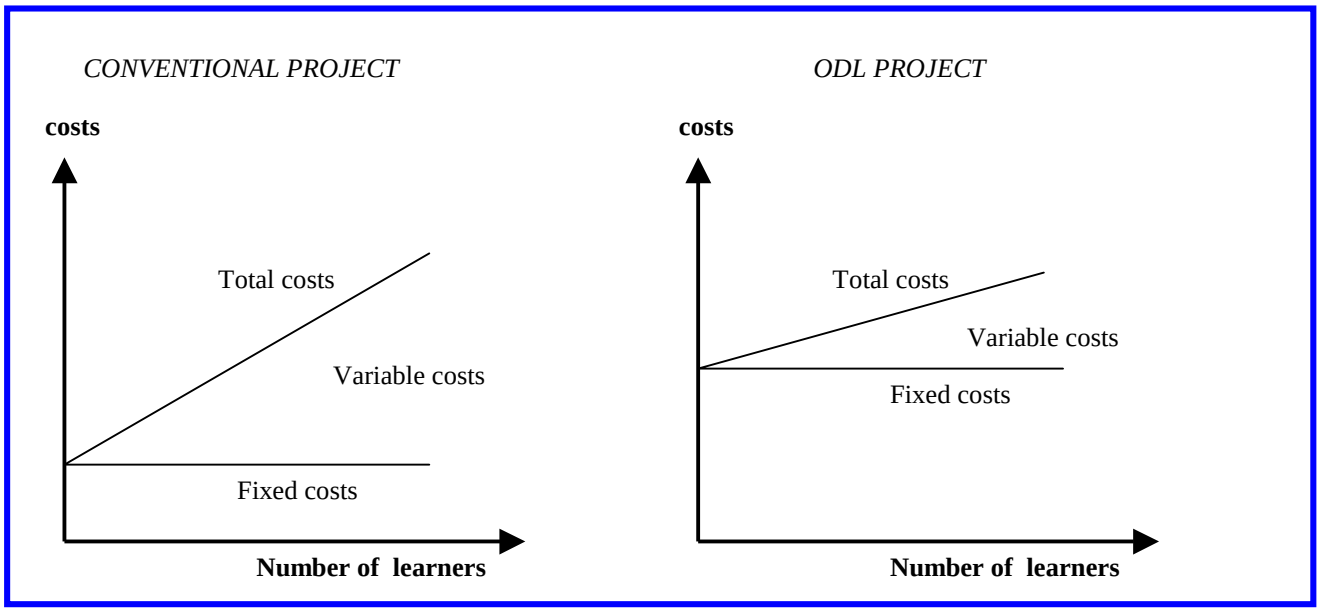
2.14.3 Fixed costs and Variable costs

There are two major categories in ODL costs:

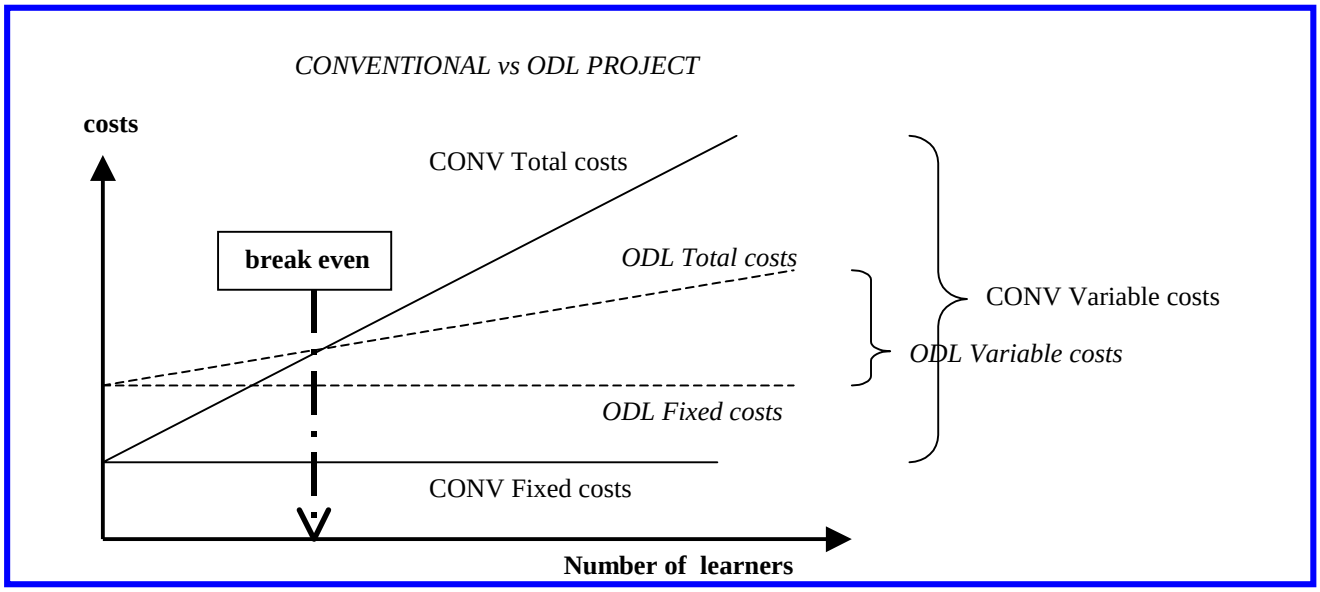
Fixed costs: These costs are independent of how many learners you are dealing with. In fact many of them are incurred before you even recruit any learners. They include such items as the salaries of managers and course developers; fees to outside suppliers; print, audio-visual and computing costs; equipment; use of facilities; warehousing; transport; rent, rates, heating, telephone, insurance etc.

Variable costs: This is the additional cost of providing for each extra learner. Every learner will cost you so much for: a copy of the project materials; any individual equipment; time from a counsellor, tutor, assessor, etc.

We can picture the difference between the cost structures. The graphs bellow compare the total, fixed and variable costs involved in providing a conventional and learning project for various numbers of learners.



In a conventional project we usually have very low fixed costs, but total variable cost rises quite steeply as we increase the number of learners. On the other hand in and ODL project, the fixed costs are much higher than in a conventional project but the total variable cost rises much more slowly as the number of learners increases.
A combination of the two graphs has an interesting outcome:



There is a "break-even" point. This is the number of learners beyond which an ODL project becomes cheaper per learner than the conventional project. This is the point at which a large fixed cost is spread over such a large number of learners that thereafter the average cost of all learners is less than in the alternative project that had lower fixed costs.

2.14.4 Estimating the costs

Rowntree [Rowntree, 1992] suggests some questions that will help estimating the costs in an ODL project:

Production costs

- What will be the cost of preliminary work before you even begin production, e.g. preparing proposals, specifications etc?

- What might you have to pay people, either in-house (colleagues from your school) or through using outside expertise for e.g. subject matter advice, ODL advice, graphic design (typography, layout), word processing, editing, copyright fees, photographs (specially bought from photo data base), audio or video-tape production etc?

- If you plan to produce computer-based training, what additional costs might you incur for programming and CBT design?

Post-production costs

- What will be the costs of producing multiple copies of the material?

- What it will cost to pilot and evaluate (and improve) the material before use?

- Will you need to up-date and improve the materials in future years?

Running costs

- What will be the salary costs for teachers / trainers?

Overhead costs

- What will be the costs of managing the whole project?

- What fraction of the general overhead will you need to charge to the project - e.g. administrative staff salaries, telephone, paper, postage, etc?

- What costs might you face in providing facilities and equipment, e.g. computers, measuring instruments etc?

Development costs (as in computer aided learning) can sometimes be justified if large numbers of learners will use the material [Rowntree, 1992]. If you can't afford the medium you would really like, don't despair. Just remember the comforting words of Wilbur Schramm [Rowntree, 1992]: "If the medium that seems ideal for a specific purpose is not available, an alternative medium is likely to do almost as well".

2.15 Evaluation of an ODL project

[Evaluation is the collection, analysis and interpretation of information about any aspect of a project of education and training, as part of a recognised process of judging its effectiveness, its efficiency and any other outcomes it may have. ODL is an innovatory approach to education and training, still in its early development stages. Surely we cannot be so confident about an innovation that there is no need to check whether aims have actually been achieved and our expectations justified?]

Mary Thorpe

2.15.1 Evaluation in general

According to Rowntree [Rowntree, 1992]:

- Evaluation is NOT just another word for assessment. The quality of our learners' learning may well be one of the outcomes we need to evaluate. But many other factors may equally worth looking at.

- The phrase "any other outcomes" reminds us that evaluation is concerned with what happens rather than merely with what was meant to happen. It should be capable of picking up the unexpected - e.g. unwanted side-effects or interesting new possibilities.

- By "a recognised process", she means that evaluation needs to be planned, systematic and openly discussed. Evaluation is not just keeping records or writing a final report. It s public commitment to purposeful enquiry.

2.15.2 Evaluation and ODL

There are many reasons why you might want to evaluate your ODL project. Other people may need convincing that your approach is effective - especially if open learning is not well established in your organisation. You may need to prove to sceptical administrators, other teachers or trainers that the results can be as good as, if not better than, those obtained by more traditional approaches. You may also have to justify your project to whoever is providing funds to develop it (e.g. the European Union, the local Ministry of Education etc). Apart from the above "political' reasons you will find the "managerial' reasons. They have to do with checking to ensure that the project is running smoothly, that people are working effectively and that acceptable results are being attained. This kind of evaluation is also called "monitoring" [Rowntree, 1992]. And monitoring must lead to action. No project can survive without it.

According to Freeman there are three levels of monitoring:

Level	Typical question being asked	Typical comparison being made
1. Project	"How is the course doing? "	– Compared to other projects or – Compared to a set standard
2. Individual tutor	"How is tutor X getting along with his or her group of students? "	– Compared to other tutors or – Compared to a set standard
3. Individual learner	"How is learner Y is getting along? "	– Compared to other learners – Compared to a set standard

Different projects suggest different priorities. For instance, if this is your first ODL project you may need to find out how its results compare with those of some previous course. Alternatively, if this project is simply the latest in a series, there may be some new feature – e.g. a new medium, or a new pedagogical approach that you need to focus on.

It is important to be aware of the wide range of things you could collect information about. But it is equally important to be selective. Don't plan to collect more than is likely to have a use.

2.15.3 Evaluation strategies

There is the *quantitative* approach and the *qualitative* approach [Rowntree, 1992]. The first is likely to be primarily interested in the formal assessment of learners and the statistical analysis of achievement tests and attitude questionnaires. The second will emphasise sensitive observation, discussion and interviewing – and it's likely to communicate its findings through revealing analogies and anecdotes.

The two strategies differ also in their focus. While the first asks, in essence, "Have the goals been achieved? " the second asks, more openly, "What has been going on? ".

Neither is right or wrong. Both quantitative and qualitative approaches may be needed for different aspects of a particular project.

2.15.4 Data collection

There are numerous methods of gathering data. Some of them - like conversation and observation - will be of most use if you regularly meet your learners and support staff in learning centers. Others - like reviewing routine records or

assessment results and sending out questionnaires - can be used in any ODL situation but may well be the chief means of gathering data when learners are at a distance.

- *Review of relevant literature / case studies*. Too often, unfortunately, these are self-promotional rather than truly informative. But some do reflect on the unresolved problems as well as list the glowing successes. This may help you look afresh at your own data and thus make better decisions or give better advice.

- *Review of assessment results*. How do learners perform in pre-tests and post tests? Such data may be vital not just in determining what has been learned but also in detecting weaknesses in the methodology.

- *Observation*. You can do a lot of "evaluation by walking about" - and observing. Observation can be informal - you just make notes later about things you happened to notice. Or it can be formal - you may use checklists and coding sheets to direct your attention and record the perhaps complex activities you have seen. Either way, you need to take care that your observation alters the events being observed.

- *Conversations*. Informal conversations can throw up all manner of feelings, concerns and danger signals that might take ages to emerge from more formal collection methods. These can be investigated further.

- *Interviews*. An interview has been called "a conversation with a purpose". An interview may be completely structured - perhaps by a questionnaire which you simply take the other person through, item by item. Or it may be semi-structured - based around some key questions, perhaps, but encouraging the other person to elaborate on anything that especially concerns them.

- *Discussion groups / workshops*. Discussions or seminars with groups of other interested parties can be a cost-effective way of obtaining a lot of information in a short time.

- *Questionnaires*. Questionnaires are probably the most widely-used data collection method in all of education and training. For evaluating a distance learning project they can be essential.

2.15.5 When to evaluate?

We may want to start evaluating even before the project is properly under way. We may run a "feasibility study" - to evaluate whether it is worth starting at all. And if the project is to go ahead, we may want to interview those concerned about their hopes, fears and expectations. We may want to identify potential problem areas. In e-Hermes project there was a test (pilot) run where the software and the methodology in general were tested. The evaluation of the test run (that was qualitative) meant to influence decisions about the fine-tuning of the project.

There is *formative* and *summative* evaluation:

- Formative evaluation collects data that can be used to change o project while it is in progress. It helps form the project.

- Summative evaluation, on the other hand, uses evaluation data to sum up the project overall once it is completed.